Big Brother Watches You (Even When He's Dead): Surveillance and Long-run Conformity[*]

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Abstract

Lack of privacy due to surveillance of personal data, which is becoming ubiquitous around the world, induces persistent conformity to the norms prevalent under the surveillance regime. We document this channel in a unique laboratory—the widespread surveillance of private citizens in East Germany. Exploiting localized variation in the intensity of surveillance before the fall of the Berlin Wall, we show that, at the present day, individuals who lived in high-surveillance counties are more likely to recall they were spied upon, display more conformist beliefs about society and individual interactions, and are hesitant about institutional and social change. Social conformity is accompanied by conformist economic choices: individuals in high-surveillance counties save more and are less likely to take out credit, consistent with norms of frugality. The lack of differences in risk aversion and binding financial constraints by exposure to surveillance helps to support a beliefs channel.

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1 Introduction

The digital revolution has radically changed the intensity and amount of information individuals can access and exchange in real time, allowing households to access educational, entertainment, and buying opportunities that were unimaginable to most even two decades ago. By accessing the internet using digital devices households all over the world can easily connect to everybody and everything in a matter of minutes.

Contrary to the pre-digital world, though, widespread consumer information—for example, their online search paths—are registered and stored in the digital era and can be accessed and observed by authorized third parties. This invasion of personal privacy has generated a broad debate about the rights of collecting and observing individual-level digital information as well as about the effects of knowing that in principle surveillance is ubiquitous on agents' behavior. The extent of surveillance is especially concerning in situations in which access to a broad range of individual-level behavior is concentrated in a few hands. This concentration is the case, for example, for large digital conglomerates that provide services across many domains, especially when individual liberties and the rule of law are not guaranteed. Even governments might ponder to use individuals' digital footprints during exceptional societal crises, such as the recent COVID-19 pandemic.[1]

In this paper, we aim to assess to what extent pervasive surveillance of individual behavior might shape beliefs and hence choices. Based on earlier research, we conjecture that pervasive surveillance might exacerbate agents' conformity to extant societal norms at the time agents are observed pervasively (see, e.g., Bursztyn, Egorov, and Fiorin, 2020). Because ingrained societal norms produce rules of thumb that agents tend to employ in their

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[1]For example, in "The world after coronavirus" in the *Financial Times* on March 20, 2020, Yuval Harari discusses surveillance in order to monitor people and punish those who break the rules to fight the pandemic.

economic choices even decades after exposure to such norms (D'Acunto, Prokopczuk, and Weber, 2018), induced conformity at the time of surveillance could shape agents' beliefs and choices over time and even if the source of surveillance was eliminated. We thus ask whether induced conformity to past social norms can shape beliefs and choice in the long run.

Tackling this question using present-day institutional settings or data is hindered by the fact that we cannot observe long time series of the choices agents make under pervasive digital surveillance, which has merely started around the world. Instead, we rely on the "History & Finance" approach: we propose studying a historical shock that has been shown to still affect aggregate economic outcomes today (Lichter, Löffler, and Siegloch, 2020)—the pervasive surveillance of citizens of the former German Democratic Republic (GDR), also known as East Germany before the fall of the Berlin Wall in 1989.

The GDR, where a communist totalitarian government ruled from the end of the Second World War until 1990, is a unique laboratory to ask our question for at least three reasons. First, due to historians' archival efforts after the fall of the Berlin Wall, we can collect detailed county-level data on the size of the main surveillance tool—unofficial informers administered by the Stasi, the GDR's secret police (Müller-Enbergs, 1996). Second, in this setting, we can set up a quasi-experimental research design (Lichter, Löffler, and Siegloch, 2020). The strategy exploits the fact that district authorities set the strategy on local territorial security, whereas virtually any other organizational and economic decision were taken at a highly centralized level. We can thus meaningfully propose a regression discontinuity design (RDD) that exploits quasi-exogenous variation in unofficial-informer densities along GDR-district borders. Third, we can collect a large set of past and present information about individuals for whom we know the county of living during communism, and hence for whom we know the extent of surveillance they faced. Beyond residence, these information include present-day

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(i) perceptions of the extent of surveillance during communism, (ii) economic and societal beliefs, (iii) elicitation of economic primitives such as risk-averse preferences, (iv) economic choices in the domain of household finances, and (v) demographic characteristics.

We first confirm the "first stage" of the channel we conjecture: higher exposure to GDR surveillance—measured using the density of unofficial Stasi informers—relates to a higher recall of being spied upon and oppressed by surveillance nearly 30 years after the fall of the Berlin Wall. For example, a one-standard-deviation increase in exposure to GDR surveillance relates to a 0.4-standard-deviation higher probability to report past Stasi denunciations today. Data from the Stasi Records Agency additionally indicate a positive correlation between surveillance and individuals' requests to inspect the original Stasi files containing information about them, a right available to former GDR citizens since 1992.

Moving on to the second step of our conjectured channel, we show higher exposure to surveillance induces broad and persistent conformity in beliefs and behavior even decades after the sources of surveillance were eradicated. Greater historical exposure to spying makes individuals less impulsive and inquisitive and induces a strong believe that others control their life. Moreover, agents exposed to higher surveillance in the past are more likely to report mainstream political views at the present day, are less likely to state they are gay, and more likely to avoid going to church despite not being less likely to hold religious beliefs. Overall, individuals exposed to higher surveillance are still less likely to state political, personal, and religious beliefs that deviate from the social norms imposed during communism.

Moreover, consistent with surveillance inducing long-run conformity to the social norms prevalent at the time of surveillance, individuals from high-surveillance counties are more cautious about embracing novel institutions and social phenomena that differ from what they have experienced in the GDR: Higher past exposure to surveillance relates to greater

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worries and more negative beliefs about immigration and refugees, as well as concerns of institutional change, such as the European Union enlargement and the introduction of the euro. Moreover, East Germans exposed to higher surveillance refrain from emigrating from East Germany after the fall of the Berlin Wall or adopting a vegetarian lifestyle.

Cautious and conformist economic choices accompany persistent conformist beliefs. Higher GDR surveillance fosters present-day investment into fixed-interest savings products, such as time deposits, which were virtually the only savings option in the GDR. The economic magnitude of this effect is large: a one-standard-deviation increase in GDR-surveillance intensity raises the probability that a present-day household exposed to such surveillance invests in fixed-interest savings products by 3.6 percentage points, or 33%.

Consistent with the traditional German social norm of frugality,[2] individuals from high-surveillance counties are more likely to cite financial constraints as the predominant reason for lacking precautionary savings; that is, they do not save only when they cannot save. We confirm this conformist behavior regarding saving by considering individuals' willingness to take on debt. A one-standard-deviation higher exposure to surveillance lowers households' probability to carry non-mortgage loans by 3.2 percentage points, or 11%, between 1997 and 2018. The effect on mortgage debt, in lockstep with home ownership, is also significantly negative, albeit weaker statistically. Given that accumulating debt—non-mortgage debt in particular—is considered not conforming to social norms in Germany, surveillance-induced long-run conformity might be a mechanism behind individuals abstaining from accumulating debt until the present day.

In the last part of the paper, we consider four channels different from surveillance-induced long-run conformity, which in principle might explain the cautious economic choices of agents

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[2]For example, the German Historical Museum in 2018 ran an exhibition on Germans' desire to save. See "An exhibition on German saving, the virtue turned problem" in the *The Economist* on March 28, 2018.

subject to severe surveillance in the past. First, we consider risk preferences. The constant threat of Stasi surveillance and punishment in case of detection of condemned behavior may have instilled aversion to taking risk in individuals. A second channel could be the systematic lack of education for individuals more exposed to Stasi surveillance. Hampering educational or career advancement was a common tool by the Stasi to exert pressure on citizens. Reducing the accumulation of human capital was also common in other communist dictatorships in the post-WWII period, such as China during the Cultural Revolution. The third channel is lower wealth accumulation for highly-exposed individuals, who might have earned lower incomes than other East-German agents during the post-WWII period due to the pressure faced by higher surveillance. Fourth, surveillance by unofficial informers, such as neighbors and fellow employees, might have inhibited trust.

We can test directly for a role of all of these four channels in our data, because we do observe direct survey-elicited measures for all four channels at the individual level. First, we find that the spatial variation in surveillance is unrelated to any of these channels, which suggests that none of these channels varies systematically, on average, across counties with higher or lower exposure to surveillance. Second, we propose specifications in which we repeat our main analysis but add the four proxies for the alternative channels as control variables. We find that none of these four controls, when added to the main specifications, alters the coefficient on county-level surveillance either economically or statistically.[3] Overall, we conclude that individual conformity induced by pervasive surveillance in the GDR is a compelling explanation for why high-intensity surveillance promotes cautious beliefs and economic choices even decades after the source of surveillance disappeared.

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[3]Note that, even though we do not find evidence of a correlation between county-level surveillance and any of these channels, one might still worry that we introduce a selection-bias term by controlling for variables that might themselves be outcomes of surveillance ("bad controls") (Angrist and Pischke, 2009).

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Related literature   Our paper relates to the literature on the determinants of conformity and the effects of conformity on economic choices. Individuals conform because others serve as a source of informational influence (e.g., Bikhchandani, Hirshleifer, and Welch, 1998) or because of a desire to fit in (see Bursztyn and Jensen (2017) for an overview). We argue that, consistent with theory (Bernheim, 1994), citizens subject to government surveillance recognize that departures from prevailing rules impair their status, fostering a desire to fit in that outlasts surveillance. Regarding consequences of conformity, Prendergast (1993) finds hampered information transmission resulting from managers that conform to supervisors' opinions in order to appear competent. Andreoni, Nikiforakis, and Siegenthaler (2020) use a laboratory experiment to study "conformity traps," that is, situations in which groups fail to coordinate on a beneficial action because members conform to the predominant behavior. They show that opinion polls can facilitate changes of norms. We find that surveillance-induced conformity leads to economic choices that favor investments into financial products seen as coherent with the status quo and social norms, such as savings accounts, and to shy away from economic choices that deviate from social norms, such as debt accumulation.

More specifically, our paper belongs to a line of inquiry on the social and economic consequences of covert activities. Closest to our work, Lichter, Löffler, and Siegloch (2020) similarly exploit district discontinuities to show that Stasi surveillance lowered long-run individual trust and labor-market performance, confirming earlier cross-sectional results (Jacob and Tyrell, 2010). We add to these papers in two ways. First, we propose an economic channel through which exposure to surveillance during one's lifetime affects beliefs and economic choices: the desire to conform to extant social norms. Second, we consider household-level economic choices such as savings, investments, and debt accumulation. At a more aggregate level, Glitz and Meyersson (2020) find that Stasi industrial espionage in West Germany led

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to a significant narrowing of sectoral TFP gaps between East and West Germany. Declassified intelligence reveals that, during the Cold War, CIA-supported foreign coups increased the stock prices of expropriated multinationals (Dube, Kaplan, and Naidu, 2011). US covert services also engaged in interventions that installed political leaders in other countries, which in turn increased the amount of imports from the US (Berger et al., 2013).

2 Data and empirical strategy

2.1 Individual data

The individual-level data we employ to estimate the effect of government surveillance on social and economic conformity come from the German Socio-Economic Panel (SOEP) run by the German Institute for Economic Research (Goebel et al., 2019). Importantly, SOEP covers East German households every year since June 1990, that is, prior to German reunification. Our focus is on all respondents from the 1990 wave, whom we follow over time. We add children of respondents from the initial wave, who were too young to participate in 1990, once they enter the SOEP. We are thus able to assign treatment—that is, surveillance intensity—based on the individuals' place of living under communism.[4] We limit the sample to household heads because we observe economic choice on the household level and strive for a consistent sample across the tests (see, e.g., D'Acunto, Prokopczuk, and Weber, 2018). Appendix Table A1 presents summary statistics for the main SOEP variables.

Surveillance perception The analysis on surveillance and its long-run perception relies on data from a special 2018 SOEP questionnaire. This questionnaire is on life in the GDR, posed to the subset of respondents who actually lived under communism. Among the

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[4]We omit respondents who moved between the fall of the Berlin Wall and June 1990 (3.7% of sample).

respondents are those who were part of the original 1990 sample and still fill out the annual survey. Our interest lies in four questions related to Stasi surveillance: (i) its perception, (ii) experienced denunciations, (iii) Stasi-folder inspection, and (iv) Stasi contact approaches. These variables are measured on ordinal scales; for example, the question on surveillance perception allows the respondent to exert degrees of confidence in having been spied on.

Social conformity We propose multiple proxies for social conformity from various SOEP waves. Impulsive and inquisitive behavior, measured in 2008, 2013, and 2018 on ordinal scales, is at odds with suppression of individual desires and opinions. Asked in many years between 1994 and 2015, a question on the extent to which others control the respondent's life is in the spirit of the conformity measures by Hong and Page (1989). We further use mainstream political views, defined as those other than far-left or -right political party preferences (measured in 2005, 2009, and 2014). Finally, we focus on homosexuality (2016) and religious visits (most years since 1990), both condemned under communism.

Adding to conformity, we aim to capture attitudes toward deviation from what is known. In the social domain, we use worries about immigration (1999–2018), the first principal component of beliefs on refugees (2016 and 2018), and the adoption of a vegetarian or vegan lifestyle (2016 and 2018). In the institutional domain, we focus on worries about EU expansion during the Eastern enlargement (2004–2008), as well as beliefs on the euro introduction (2002) by calculating its first principal component.

Economic conformity We propose two financial categories with strong German perceptions to proxy economic conformity: savings and debt. On the savings side, we define a dummy equal to one if a household invests in fixed-interest savings products over the years 2001–2016. These products comprise mainly time deposits, covered bonds, and government bonds. We additionally define a dummy equal to one if those who do not engage

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in precautionary savings state that financial constraints prohibit them from saving (most years between 2001 and 2018). On the debt side, we separately look at non-mortgage loans (1997–2018) and mortgages (1991–2018). We finally investigate home ownership (1990–2018), arguably affected by the propensity to take on debt.

2.2 Regional data

In addition to individual data, we require extant regional data to estimate the effect of government surveillance on conformity. We assemble county-level data from various sources and decades. To match these data to SOEP households, we harmonize all county data to 1990 boundaries.[5] Summary statistics on the county variables are in Appendix Table A2.

Surveillance intensity The main explanatory variable is the surveillance intensity measured at the GDR-county level. Following existing literature (Jacob and Tyrell, 2010; Lichter, Löffler, and Siegloch, 2020), we measure intensity as the average fraction of unofficial Stasi informers to the population over the years 1980–1988.[6] While the Stasi differentiated between multiple types of informers, our focus is on operative informers (IM1), who were actively involved in spying and constituted the largest group of informers. Most of the surveillance data are from Müller-Enbergs (2008). Through a collaboration with the Stasi Records Agency, we could collect additional surveillance information from previously unobserved counties. With data for 203 counties (out of 209 county offices), we have assembled the most comprehensive coverage of Stasi informers to date.

Surveillance perception While the main data on Stasi perceptions are from SOEP, we

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[5]The harmonization of Weimar Republic data requires accounting for larger territorial changes. For that purpose, we overlay shapefiles by MPIDR and CGG (2011) from the Weimar Republic with the 1990 shapefile and calculate area weighting factors that allow for an adjustment of Weimar data to 1990 borders.

[6]Some GDR counties featured a dedicated on-site office in addition to its Stasi county branch. These entities monitored activity in seven critical universities and companies. We add the respective informers to the county total and control for the presence of on-site offices, similar to Lichter, Löffler, and Siegloch (2020).

also infer perceptions of surveillance through administrative data on Stasi-folder inspections. From the Stasi Records Agency we obtain the district-level number of requests to inspect Stasi files by former GDR citizens. These annual data span the years 1992–2016. We calculate the total number of requests per district, scaled by its 1988 population. We have to drop some of the districts; for example, we omit Berlin, as it is the "go-to" office for all former citizens who do not directly send their file request to the district where they lived.

Controls We include four sets of historical covariates in the surveillance estimations. First, we account for the GDR-county and -population structure: share of young and retired people, log population density, border to sea or other country, and county-centroid latitude and longitude.[7] Second, we absorb differences in the GDR industrial structure, controlling for log industrial output, employment shares by industry, employment share of the dominant industry, and the share of cooperative members. Third, we use various measures on the intensity of protests in 1953, which triggered the rise of the Stasi (Mohr, 2019). Fourth, we control for predetermined and potentially persistent characteristics from the era of the Weimar Republic (Becker, Mergele, and Woessmann, 2020): share of Jews and Protestants to absorb religious differences, rate of unemployment, self-employment, and share of white-collar workers, as well as election turnout and vote share of the Nazi and communist parties to proxy extremism. We show how these controls relate to surveillance intensity in Appendix Table A3.

2.3 Empirical strategy

The empirical strategy exploits quasi-random variation in surveillance intensity along GDR-district borders based on three administrative features. First, each district office out of

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[7]We control for longitude as differential shocks to institutions affected western regions (Acemoglu et al., 2011), and for latitude because of pre-communist industrial traditions in southern parts of East Germany.

15 had complete responsibility over their territorial security; no interference existed from the central Politburo in East Berlin (Gieseke, 2014). Second, districts were delineated with the overarching goal to establish spatial economic equality; secondary goals, such as the clustering of industries, were rarely achieved (Lichter, Löffler, and Siegloch, 2020). Third, the decentralized security strategy contrasted a state structure that otherwise followed the Soviet example: local authorities, with no legislative powers, were subordinate to the central administration (Bartsch, 1991). These three administrative features suggest smoothness around district borders other than in surveillance intensity. In support of the importance of districts for surveillance, we show in Appendix Table A3 that district fixed effects have substantial power in explaining county-level variation in surveillance intensity.

We exploit the quasi-random variation in surveillance intensity in a regression discontinuity design to estimate the effect of surveillance under communism on post-reunification conformity. The baseline specification is the following:

$$Y_{it} = \beta_1 \, Spy_c + \beta_2 \, Office_c + \boldsymbol{X}_{it} \, \beta_3 + \boldsymbol{Z}_c \, \beta_4 + \mu_p + \delta_w + \theta_t + \epsilon_{it}. \tag{1}$$

Y_{it} is one of the conformity measures introduced in Section 2.1 for individual i in year t. Spy_c refers to the surveillance-intensity measure also defined in Section 2.1. $Office_c$ is a dummy equal to one if the Stasi held an on-site office dedicated to an entity in county c. The controls in $\boldsymbol{X}_{it}$ include gender, age, and age squared. We abstain from including more extensive individual controls, as these might be shaped by exposure to surveillance; see Section 5 for an explicit discussion. $\boldsymbol{Z}_c$ denotes a vector of the above-mentioned historical controls aimed at capturing drivers of surveillance. These relate to the GDR-county and -population structure, industrial factors, regime opposition, and Weimar Republic characteristics.

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μ_p are fixed effects of contiguous-county pairs that straddle GDR-district borders. By conditioning on these fixed effects, our parameter of interest, β_1, captures differences in surveillance intensity within these pairs, induced in part by district discontinuities. δ_w control for pre-WWII-state fixed effects from the Weimar Republic to account for long-term cultural differences. We include survey-wave fixed effects, denoted by θ_t, when a conformity measure is elicited across multiple waves. We allow idiosyncratic differences, ϵ_{it}, to be correlated across individuals within county pairs and within counties, so as to account for shocks affecting county pairs and for the duplication of some counties that are part of multiple pairs.

3   Perceived surveillance in the long run

As a necessary condition for our analysis, we must first establish that localized differences in surveillance intensity explain variation in surveillance perceptions, and that perceptions are long-lasting. An effect on perceptions is uncertain. The threat of surveillance appeared to be omnipresent (Bruce, 2012). For example, one tenant in every apartment building was a Stasi informer (Koehler, 2000). Citizens might then only have noticed the baseline threat of surveillance, with the intensive margin having negligible impact. Measurement error in our surveillance-intensity proxy could dampen effects on perceptions further.

Table 1 shows that higher surveillance intensity indeed fosters long-lasting perceptions of being spied upon. Data on surveillance perceptions are from a 2018 GDR survey administered by SOEP. Given that our baseline sample of household heads is small nearly 30 years after the fall of the Berlin Wall—we require respondents to enter the sample in 1990 to observe their place of living during communism—we also estimate Equation 1 on all household members

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(results are in odd-numbered columns). The effect of surveillance is economically large for all measures of perceptions: the respondent noticed being spied upon, reports denunciation by the Stasi, inspected their own Stasi folder and was contacted by the Stasi. For example, a one-standard-deviation higher surveillance intensity induces an increase in Stasi-folder inspections by 0.6 standard deviations (Columns 5–6). Despite the small sample size, the surveillance coefficient is mostly highly statistically significant. The effect is most precisely estimated for folder inspections, that is, when measurement error in surveillance perception is lowest.

In Appendix Figure A1, we additionally show a positive correlation between surveillance and 1992–2016 Stasi-folder inspections from administrative data, consistent with Lichter, Löffler, and Siegloch (2020). An unconditional correlation is on the left panel; a correlation conditional on population structure (share of young and old people, population density) is on the right. Administrative data are from the Stasi Records Agency, which reports only on the less granular district level, so we are unable to implement the border discontinuity design (Equation 1). We further have to omit four districts, resulting in only eleven data points.[8] We thus interpret the correlation cautiously as suggestive additional evidence.

4 Surveillance and conformity

4.1 Social conformity

Social behavior   Table 2 shows that greater Stasi surveillance fosters contemporary social conformity across a wide range of outcomes. Columns (1) and (2) reveal that surveillance

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[8]We drop Potsdam, as the office closed in 2009; Berlin, as it is the "go-t" office for many citizens who do not directly contact the district in which they lived; and Cottbus and Frankfurt Oder, which report together.

intensity leads to lower impulsiveness and inquisitiveness. Measured in 2008, 2013, and 2018, this self-reported behavior is consistent with suppression of individual desires and opinions. In terms of magnitudes, a one-standard-deviation increase in surveillance intensity reduces impulsiveness by 0.15 and inquisitiveness by 0.1 of a standard deviation. Column (3) documents surveillance increases the perceived extent to which others control the respondent's life. This belief is elicited in many years between 1994 and 2015. We also find induced conformity in the political domain (Column (4)): a one standard-deviation higher surveillance intensity lowers the probability of reporting far-left or -right political preferences by 3.7 percentage points, or 26%. We define political preferences, measured in 2005, 2009, and 2014, as extreme when individuals self report a number below three or above seven on a 0–10 scale.

Columns (5)–(7) focus on outcomes that were particularly condemned under communism in East Germany. Individuals from counties with surveillance higher by one standard deviation are ten percentage points more likely to state heterosexual preferences (Column 5).[9] We emphasize that sexual preferences were elicited in 2016, that is, 27 years after the fall of the Berlin Wall. Higher surveillance intensity further reduces church visits by 0.16 standard deviations (Column 6), despite individuals reporting not to be less religious (Column 7).

We use additional administrative data to investigate another high-stakes anti-conformist act: migration (Kitayama et al., 2006; Knudsen, 2019). Specifically, we regress log county population on surveillance × year interactions.[10] Figure 1 shows the results. Higher surveillance intensity is associated with lower emigration from 1989 on, the year the Berlin Wall came down, onward. In terms of magnitudes, relative to a baseline population drop of 7.7% between 1988 and 1992 (not shown), this drop is 4 percentage points weaker in counties

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[9]Those not heterosexual report either homosexual or asexual preferences.
[10]We cluster standard errors at the county level.

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subject to a one-standard-deviation higher surveillance intensity.

Beliefs about deviancy Adding to conformity in behavior, Table 3 documents that surveillance induces caution in supporting deviancy from what is known. Individuals from high-surveillance counties are more worried about immigration (Column (1)) and EU expansion (Column (2)), despite not appearing to be more worried in general (Column (3)). Worries about immigration are elicited annually since 1999, while questions on the EU expansion are from 2004–2008, thereby arguably referring to the EU's eastern enlargement. We also extract the first principal component of survey answers referring to beliefs about the introduction of the Euro in 2002 and about refugees during the recent refugee crisis, respectively. Surveillance produces negative beliefs about both the Euro and refugees. Finally, in Column (6), we show that higher surveillance inhibits the adoption of a vegetarian or vegan lifestyle, indicating that aversion to deviancy from what is known is wide-ranging across different domains.

4.2 From social to economic conformity

Table 4 reports results on cautious and conformist economic choices. To elicit economic conformity, we focus on two financial categories for which Germans have strong views: savings, seen as a virtue, and debt, which is stigmatized. We find that surveillance increases investments into fixed-interest savings products, such as time deposits, over the years 2001–2016 (Column (1)). The magnitude is large: a one-standard-deviation higher surveillance intensity increases the probability to invest by 3.6 percentage points, or one third of the mean probability to invest. Column (2) uses data on the question whether not engaging in precautionary savings is because of financial constraints. The coefficient on surveillance is significantly positive; that is, more individuals from higher-surveillance counties do not save

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only when they cannot because they are constrained. Surveillance fostering contemporaneous savings is also consistent with existing literature that reports higher precautionary savings in East relative to West Germany (Fuchs-Schündeln, 2008; Fuchs-Schündeln and Schündeln, 2005).

Economic decisions that are both cautious and conformist are also reflected in a hesitation to take out loans. A one-standard-deviation higher surveillance intensity lowers non-mortgage loan take-up by 3.2 percentage points, which corresponds to 11% of the mean probability of paying back loans (Column (3)). We observe loans in all years between 1997 and 2018. Column (4) reports a negative effect of surveillance on mortgage debt (measured between 1991 and 2018). Note that the coefficient on surveillance is significant only at the 10% level. Possibly affected by debt aversion, the effect of surveillance on home ownership is also negative (Column (5)).

5 Alternative channels

Risk aversion We examine risk aversion as the key alternative channel linking surveillance experience to cautious economic choice. Preferences toward risk are malleable by individual experiences (Malmendier and Nagel, 2011). Negative experiences induced by Stasi surveillance may have increased risk aversion, which in turn may have lowered financial risk-taking. To investigate the role of risk aversion, we use SOEP data on the self-reported willingness to take risks on a 0–10 scale, which we observe in most years between 2004 and 2018.

Panel A of Table 5 reports the results on risk aversion. Column (1) reveals that the effect of surveillance intensity on risk tolerance is weakly negative but statistically indistinguishable from zero. We nonetheless examine the stability of the coefficient on surveillance intensity

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when we add risk tolerance as an explanatory variable in regressions of economic choice (Columns (2)–(6)).[11] The coefficient on surveillance is robust to adding risk tolerance as a regressor. Note that (i) the coefficient on surveillance is stable despite a smaller sample size and that (ii) the coefficient on risk tolerance is often insignificant.

Career or educational advancement Denunciations as a consequence of surveillance (cf. Section 3) may have lowered career or educational advancement, which in turn may affect economic choice. Indeed, common real-life consequences of surveillance activities included students being denied the opportunity to study or workers being dismissed in case of anti-regime or deviant behavior (Bruce, 2012). We investigate this possibility using data on household income as well as household head's educational achievement.

Panels B and C of Table 5 show that surveillance intensity does not significantly affect long-run income or the probability of obtaining a tertiary education (Column (1)). Education and, in particular, income contribute to explaining economic choice when added as regressors to the estimation of Equation 1 (Columns (2)–(6)); however, the coefficient on surveillance intensity is robust to the inclusion of the additional controls. Overall, risk aversion and consequences of Stasi denunciations are thus unlikely to be key drivers of our results; instead, our preferred interpretation is that exposure to surveillance has produced widespread, long-lasting desire to conform, affecting social behavior, beliefs about social and institutional change, as well as economic choice.

6 Summary

Personal-data surveillance is becoming ubiquitous around the world. We study its long-run effects using the unique laboratory of communist East Germany. Our empirical framework

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[11]As surveillance might drive risk tolerance, we sacrifice econometric rigor by estimating such a model.

rests on novel administrative data on surveillance and extant information on survey respondents whom we can track over time starting from the period of communism until today; the framework further exploits quasi-random variation in surveillance intensity at the local level. We show that surveillance has produced a recall of being spied upon, as well as persistent conformity in social behavior, beliefs about social and institutional change, and economic choice. The lack of differences in risk aversion or income and educational attainment by exposure to surveillance helps to support a beliefs channel.

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Figures and tables

Figure 1: Surveillance and lack of migration
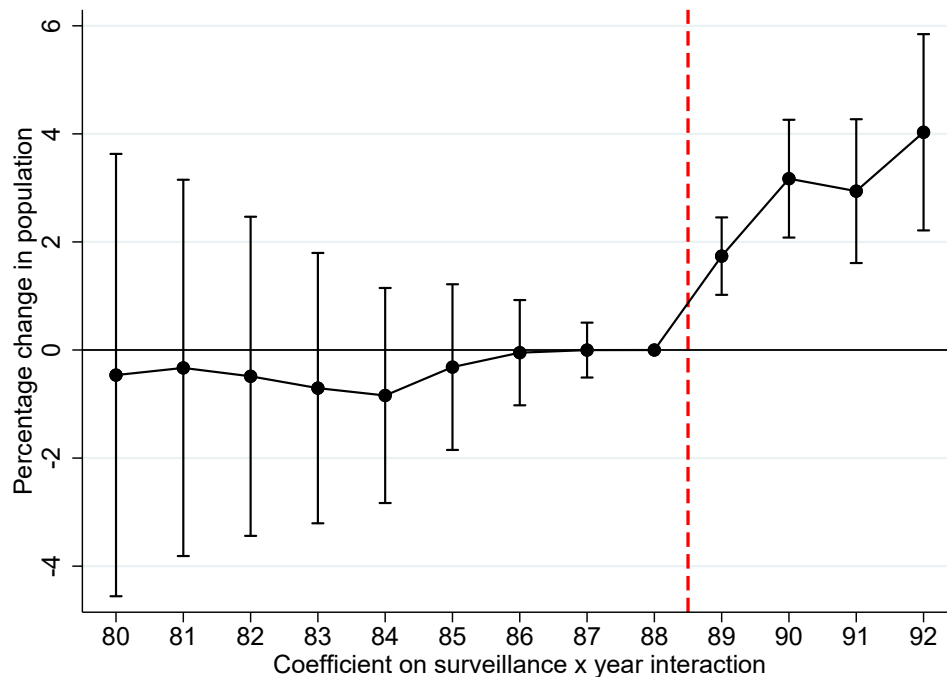
Notes: GDR emigration following the fall of the Berlin Wall is less pronounced in high-surveillance counties. The unit of observation is the 1990-GDR-county level. Each dot depicts a coefficient from the regression of log county population on surveillance × year interactions. Our measure of surveillance is the average county-level share of unofficial informers in the population over the years 1980–1988. Vertical bands are 90% confidence intervals for the point estimates. Standard errors are clustered at the 1990-GDR-county level.

Table 1: Perceived surveillance in the long run

Dependent variable:	Perceived surveillance		Denunciated by Stasi		Stasi-folder inspected		Contacted by Stasi	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Surveillance intensity	0.213	0.322***	0.442***	0.424***	0.637***	0.615***	0.488**	0.317
	(0.147)	(0.105)	(0.154)	(0.149)	(0.083)	(0.066)	(0.186)	(0.200)
Dep. variable mean	0	0	0	0	0	0	0	0
Observations	382	600	382	599	353	558	381	599
Number of counties	62	63	62	63	57	59	62	63
Adjusted R^2	0.033	0.073	0.217	0.146	0.008	0.041	0.072	0.036
Household heads only	Y		Y		Y		Y	
Baseline controls	Y	Y	Y	Y	Y	Y	Y	Y
Border-county-pair FE	Y	Y	Y	Y	Y	Y	Y	Y
Weimar-state FE	Y	Y	Y	Y	Y	Y	Y	Y

Notes: Surveillance fosters perceptions of being spied upon, elicited in 2018. Equation 1 is the underlying econometric model, which we estimate at the individual level. Column titles indicate the dependent variables; see Section 2.1 for variable details. We standardize all variables, so that the coefficient indicates the standard-deviation effect of an increase in surveillance intensity by one standard deviation. *Surveillance intensity* is the average county-level share of unofficial informers in the population over the years 1980–1988. *Baseline* controls are individual's gender, age, and age squared, a county-level indicator for presence of a Stasi on-site office, and historical, county-level characteristics described in Section 2.2. *Border-county-pair FE* denote dummies for pairs of contiguous counties that straddle a GDR-district border. Reported in parentheses, we cluster standard errors at the 1990-county and county-pair level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 2: Surveillance and long-run conformity in social behavior

Dependent variable:	Impulsive	Inquisitive	Control life	Extreme views	Hetero	Religious visits	Religious (placebo)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Surveillance intensity	−0.145***	−0.096*	−0.092***	−0.037***	0.100**	−0.159**	0.012
	(0.054)	(0.054)	(0.021)	(0.010)	(0.048)	(0.069)	(0.017)
Dep. variable mean	0.000	0.000	0.000	0.140	0.847	0.000	0.304
Observations	2,430	2,429	8,095	2,947	621	5,010	8,157
Number of counties	75	75	77	76	65	72	77
Adjusted R^2	0.047	0.091	0.316	0.032	0.242	0.262	0.155
Baseline controls	Y	Y	Y	Y	Y	Y	Y
Border-county-pair FE	Y	Y	Y	Y	Y	Y	Y
Weimar-state FE	Y	Y	Y	Y	Y	Y	Y
Survey-wave FE	Y	Y	Y	Y		Y	Y

Notes: Surveillance produces persistent conformity in social behavior. Equation 1 is the underlying econometric model, which we estimate at the individual-year level. Column titles indicate the dependent variables, measured in various years; see Section 2.1 for variable details. *Surveillance intensity* is the average county-level share of unofficial informers in the population over the years 1980–1988. *Dep. variable mean* of zero implies dependent-variable standardization, so that the coefficient indicates the standard-deviation effect of an increase in surveillance intensity by one standard deviation. *Observations* vary depending on availability of the dependent variable in a given survey wave. *Baseline* controls are individual's gender, age, and age squared, a county-level indicator for presence of a Stasi on-site office, and extant historical, county-level characteristics described in Section 2.2. *Border-county-pair FE* denote dummies for pairs of contiguous counties that straddle a GDR-district border. *Survey-wave FE* we include when we observe the dependent variable in at least two survey waves. Reported in parentheses, we cluster standard errors at the 1990-county and county-pair level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 3: Surveillance and long-run beliefs about deviancy

Dependent variable:	Worry immigration	Worry EU expansion	Worry market stability (placebo)	1st PC beliefs intro €	1st PC beliefs refugees	Vegetarian/ vegan
	(1)	(2)	(3)	(4)	(5)	(6)
Surveillance intensity	0.168***	0.100**	−0.003	−0.177***	−0.225***	−0.155**
	(0.027)	(0.039)	(0.070)	(0.056)	(0.075)	(0.077)
Dep. variable mean	0	0	0	0	0	0
Observations	19,962	5,837	5,218	1,201	1,234	1,245
Number of counties	76	76	75	75	68	68
Adjusted R^2	0.109	0.102	0.158	0.055	0.163	0.166
Baseline controls	Y	Y	Y	Y	Y	Y
Border-county-pair FE	Y	Y	Y	Y	Y	Y
Weimar-state FE	Y	Y	Y	Y	Y	Y
Survey-wave FE	Y	Y	Y		Y	Y

Notes: Surveillance promotes persistent negative beliefs about deviancy from what is known. Equation 1 is the underlying econometric model, which we estimate at the individual-year level. Column titles indicate the dependent variables, measured in various years; see Section 2.1 for variable details. We standardize all variables, so that the coefficient indicates the standard-deviation effect of an increase in surveillance intensity by one standard deviation. *Surveillance intensity* is the average county-level share of unofficial informers in the population over the years 1980–1988. *Observations* vary depending on availability of the dependent variable in a given survey wave. *Baseline* controls are individual's gender, age, and age squared, a county-level indicator for presence of a Stasi on-site office, and extant historical, county-level characteristics described in Section 2.2. *Border-county-pair FE* denote dummies for pairs of contiguous counties that straddle a GDR-district border. *Survey-wave FE* we include when we observe the dependent variable in at least two survey waves. Reported in parentheses, we cluster standard errors at the 1990-county and at the county-pair level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 4: Surveillance and long-run economic choice

Dependent variable:	Savings product (1)	No savings b/c constrained (2)	Loan (3)	Mortgage (4)	Home ownership (5)
Surveillance intensity	0.036***	0.043***	−0.032***	−0.018*	−0.052*
	(0.011)	(0.014)	(0.010)	(0.010)	(0.030)
Dep. variable mean	0.110	0.900	0.288	0.154	0.463
Observations	16,283	2,318	22,469	30,637	32,107
Number of counties	76	69	76	77	77
Adjusted R^2	0.083	0.084	0.119	0.185	0.209
Baseline controls	Y	Y	Y	Y	Y
Border-county-pair FE	Y	Y	Y	Y	Y
Weimar-state FE	Y	Y	Y	Y	Y
Survey-wave FE	Y	Y	Y	Y	Y

Notes: Surveillance promotes persistent conformity in economic choice. Equation 1 is the underlying econometric model, which we estimate at the individual-year level. Column titles indicate the dependent variables, measured in various years; see Section 2.1 for variable details. *Surveillance intensity* is the average county-level share of unofficial informers in the population over the years 1980–1988. We standardize the variable, so that the coefficient indicates the effect of a standard-deviation increase in surveillance. *Observations* vary depending on availability of the dependent variable in a given survey wave. *Baseline* controls are individual's gender, age, and age squared, a county-level indicator for presence of a Stasi on-site office, and extant historical, county-level characteristics described in Section 2.2. *Border-county-pair FE* denote dummies for pairs of contiguous counties that straddle a GDR-district border. *Survey-wave FE* we include when we observe the dependent variable in at least two survey waves. Reported in parentheses, we cluster standard errors at the 1990-county and at the county-pair level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 5: Alternative channels driving economic choice

Dependent variable:	Alternative channel (1)	Savings product (2)	No savings b/c constrained (3)	Loan (4)	Mortgage (5)	Home ownership (6)
Panel A: Risk tolerance as alternative channel						
Surveillance intensity	−0.005	0.038***	0.129*	−0.046***	−0.032**	−0.048*
	(0.031)	(0.011)	(0.066)	(0.012)	(0.013)	(0.024)
Risk tolerance		0.001	−0.026*	0.011	0.000	0.002
		(0.005)	(0.014)	(0.010)	(0.010)	(0.012)
Observations	11,287	10,097	904	11,242	11,271	11,208
Panel B: Income as alternative channel						
Surveillance intensity	0.000	0.038***	0.032**	−0.032***	−0.018*	−0.052*
	(0.018)	(0.011)	(0.016)	(0.011)	(0.010)	(0.029)
Log household income		0.067***	−0.077***	0.119***	0.130***	0.231***
		(0.013)	(0.023)	(0.018)	(0.014)	(0.028)
Observations	31,182	15,700	2,218	21,748	29,613	31,066
Panel C: Education as alternative channel						
Surveillance intensity	−0.007	0.037***	0.044***	−0.032***	−0.018*	−0.051*
	(0.021)	(0.011)	(0.014)	(0.010)	(0.011)	(0.029)
Higher education		0.059***	0.008	0.006	0.035	0.101***
		(0.016)	(0.027)	(0.020)	(0.021)	(0.029)
Observations	32,225	16,268	2,315	22,452	30,619	32,089
Panel D: Trust as alternative channel						
Surveillance intensity	0.001	0.034**	0.048*	−0.006	−0.034**	−0.065**
	(0.047)	(0.016)	(0.025)	(0.013)	(0.017)	(0.026)
Trust toward strangers		0.007	−0.043**	−0.005	−0.008	0.002
		(0.010)	(0.018)	(0.010)	(0.013)	(0.014)
Observations	3,690	3,123	634	3,675	3,674	3,665
Baseline controls	Y	Y	Y	Y	Y	Y
Border-county-pair FE	Y	Y	Y	Y	Y	Y
Weimar-state FE	Y	Y	Y	Y	Y	Y
Survey-wave FE	Y	Y	Y	Y	Y	Y

Notes: Risk tolerance (Panel A), educational (Panel B) or career (Panel C) advancements, and trust (Panel D) are unlikely drivers behind the effect of surveillance on economic conformity. Equation 1 is the underlying econometric model, which we estimate at the individual-year level. Column titles indicate the dependent variables, measured in various years; see Section 2.1 for variable details. *Surveillance intensity* is the average county-level share of unofficial informers in the population over the years 1980–1988. Columns 2–6 report results when we add the proxy for the alternative channel as explanatory variable to the model. *Observations* vary depending on variables availability in a given survey wave. *Baseline* controls are individual's gender, age, and age squared, a county-level indicator for presence of a Stasi on-site office, and extant historical, county-level characteristics described in Section 2.2. *Border-county-pair FE* denote dummies for pairs of contiguous counties that straddle a GDR-district border. Reported in parentheses, we cluster standard errors at the 1990-county and at the county-pair level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Online Appendix:

Big Brother Watches You (Even When He's Dead): Surveillance and Long-run Conformity

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Not for Publication

A   Appendix figures and tables

Figure A1: District-level surveillance and Stasi-folder inspection
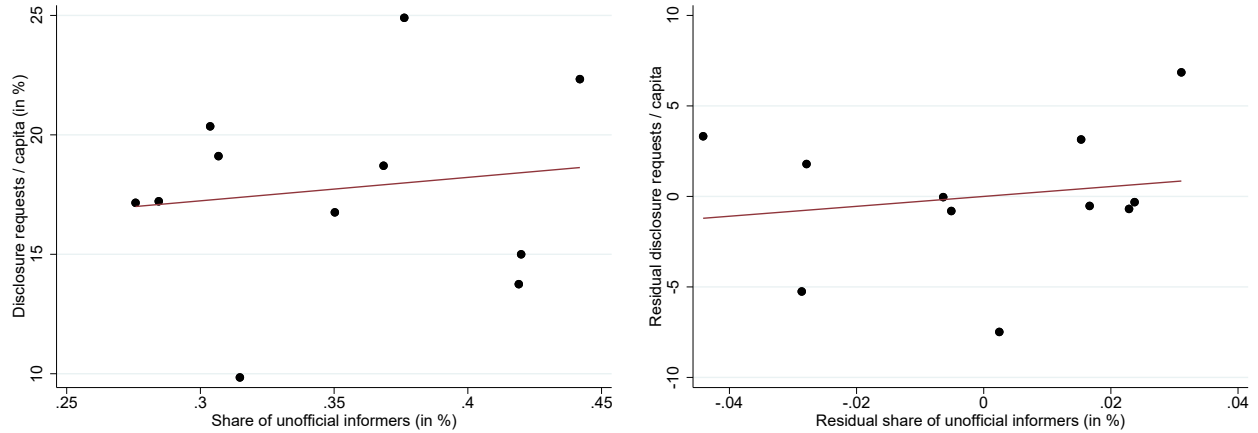
Notes: Surveillance intensity positively correlates with Stasi-folder disclosure requests. Both figures show binned bivariate means on the district level of the share of unofficial informers in the population over the years 1980–1988 and the per-capita requests for Stasi-folder inspections over the years 1992–2016. On the left panel is the unconditional correlation. On the right panel is the correlation conditional on population structure (share of young and old people, population density).

Table A1: Descriptive statistics on SOEP variables

Statistics:	N	Mean	P50	SD	Min	Max
Individual characteristics						
Age	62,419	46.82	46.00	17.56	17.00	101.00
Female	62,419	0.53	1.00	0.50	0.00	1.00
Household head	62,419	0.53	1.00	0.50	0.00	1.00
Surveillance recall						
Perceived surveillance	616	0.88	0.00	1.19	0.00	3.00
Denunciated by Stasi	615	0.34	0.00	0.64	0.00	2.00
Stasi-folder inspection	566	0.54	0.00	1.04	0.00	3.00
Contacted by Stasi	615	0.19	0.00	0.48	0.00	2.00
Conformity						
Impulsive	4,126	4.78	5.00	2.09	0.00	10.00
Inquisitive	4,089	5.29	5.00	1.24	1.00	7.00
Control my life	15,800	3.58	3.00	1.39	1.00	7.00
Extreme political views	5,364	0.14	0.00	0.35	0.00	1.00
Heterosexual	941	0.86	1.00	0.35	0.00	1.00
Religious visits	10,290	0.38	0.00	0.66	0.00	3.00
Religious (placebo)	16,217	0.32	0.00	0.47	0.00	1.00
Aversion to change						
Worries about immigration	36,793	1.16	1.00	0.72	0.00	2.00
Worries about EU enlargement	11,126	1.10	1.00	0.70	0.00	2.00
Worries financial-market stability (placebo)	8,870	1.20	1.00	0.71	0.00	2.00
1st PC of euro-beliefs responses	2,410	-0.12	-0.15	1.73	-4.97	4.21
1st PC of refugee-beliefs responses	1,919	0.02	0.23	1.83	-3.10	5.79
Vegan/vegetarian	1,939	0.03	0.00	0.19	0.00	2.00
Finance (household level)						
Savings products	16,796	0.11	0.00	0.32	0.00	1.00
Financial constraints given no savings	2,347	0.90	1.00	0.30	0.00	1.00
Loan	23,175	0.29	0.00	0.45	0.00	1.00
Mortgage	31,632	0.15	0.00	0.36	0.00	1.00
Home ownership	33,167	0.46	0.00	0.50	0.00	1.00

Notes: This table reports summary statistics for the main individual-level variables. The variables are from SOEP and are available across various survey waves. We present the number of observations (N), mean, standard deviation (SD), minimum (Min), and maximum (Max).

Table A2: Descriptive statistics on historical variables

Statistics:	N	Mean	P50	SD	Min	Max
Surveillance intensity	202	0.38	0.36	0.14	0.12	0.92
Dummy: GDR object of special interest	204	0.03	0.00	0.18	0.00	1.00
Log population density 1988	215	4.98	4.77	1.06	3.48	8.16
Population share aged under 15 1989	215	19.82	19.83	1.76	15.56	24.74
Population share aged above 64 1989	215	13.45	13.45	2.23	5.68	19.33
Dummy: any border	215	0.34	0.00	0.48	0.00	1.00
GDR-country latitude	215	51.90	51.59	1.11	50.35	54.44
GDR-country longitude	215	12.52	12.44	1.15	10.11	14.96
Opposition intensity 1953	215	1.47	1.00	1.28	0.00	4.00
Dummy: emergency status 1953	215	0.85	1.00	0.36	0.00	1.00
Dummy: military intervention 1953	215	0.52	1.00	0.50	0.00	1.00
Log production 1989	215	7.04	7.29	1.41	0.00	9.92
Share employment agriculture 1989	215	17.18	14.60	12.49	0.00	51.40
Share employment industry 1989	215	45.33	47.10	13.64	16.80	78.30
Industry concentration 1989	215	38.76	35.30	11.50	19.50	78.90
Share cooperative members 1989	215	14.78	12.86	9.75	1.20	39.61
Share Protestants 1925	212	91.95	92.97	6.64	16.37	97.71
Share Jews 1925	212	0.15	0.10	0.14	0.01	0.87
Electoral turnout 1928-32	212	82.59	82.11	3.68	72.40	92.04
Vote share communists 1928-32	212	13.90	12.77	6.06	2.79	35.87
Vote share Nazis 1928-32	212	27.61	27.53	4.69	10.66	41.77
Share unemployed 1933	212	15.32	15.56	5.52	3.69	28.51
Share self-employed 1933	212	16.46	16.19	2.55	11.10	22.79
Share white collars 1933	212	6.77	6.29	2.28	3.17	17.11

Notes: This table reports summary statistics for the historical variables, harmonized to 1990-county boundaries. The variables are from multiple sources and various years. We present the number of observations (N), mean, standard deviation (SD), minimum (Min), and maximum (Max).

Table A3: Determinants of surveillance intensity

Dependent variable:	County-level surveillance intensity						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dummy: GDR object of special interest	0.531	0.878***	0.941***	0.879***	0.961***	0.904***	0.936***
	(0.355)	(0.270)	(0.274)	(0.248)	(0.278)	(0.284)	(0.304)
Log population density 1988		−0.406***	−0.426***	−0.445***	−0.360***	−0.375***	−0.319**
		(0.070)	(0.073)	(0.110)	(0.128)	(0.143)	(0.150)
Population share aged under 15 1989		−0.066	−0.079	−0.030	−0.111	−0.122	−0.135
		(0.126)	(0.138)	(0.154)	(0.189)	(0.217)	(0.211)
Population share aged above 64 1989		−0.117	−0.134	−0.096	−0.084	−0.104	−0.124
		(0.141)	(0.153)	(0.176)	(0.192)	(0.237)	(0.223)
Dummy: any border		0.253**	0.271**	0.176	0.096	0.051	0.138
		(0.124)	(0.125)	(0.130)	(0.161)	(0.166)	(0.171)
GDR-country latitude		0.152*	0.079	0.132	0.155	0.240	0.433
		(0.088)	(0.095)	(0.099)	(0.122)	(0.246)	(0.364)
GDR-country longitude		0.150**	0.137*	0.130*	0.178**	0.205*	−0.242
		(0.072)	(0.072)	(0.069)	(0.086)	(0.121)	(0.173)
Opposition intensity 1953			−0.071	−0.090	−0.105	−0.118	−0.090
			(0.068)	(0.066)	(0.076)	(0.080)	(0.080)
Dummy: emergency status 1953			0.400**	0.502***	0.471***	0.490***	0.445**
			(0.159)	(0.151)	(0.168)	(0.174)	(0.197)
Dummy: military intervention 1953			0.120	0.142	0.187	0.223	0.243
			(0.161)	(0.155)	(0.160)	(0.163)	(0.162)
Log production 1989				−0.214***	−0.192***	−0.210***	−0.196**
				(0.073)	(0.073)	(0.079)	(0.085)
Share employment agriculture 1989				−0.505**	−0.373	−0.358	−0.396
				(0.251)	(0.262)	(0.264)	(0.297)
Share employment industry 1989				0.051	0.053	0.105	0.137
				(0.156)	(0.156)	(0.169)	(0.179)
Industry concentration 1989				0.155**	0.157**	0.158**	0.165**
				(0.069)	(0.075)	(0.074)	(0.078)
Share cooperative members 1989				0.243	0.160	0.164	0.309
				(0.212)	(0.224)	(0.231)	(0.251)
Share Protestants 1925					−0.024	−0.021	−0.052
					(0.061)	(0.072)	(0.071)
Share Jews 1925					−0.024	−0.018	−0.762
					(0.035)	(0.037)	(0.462)
Electoral turnout 1928-32					−0.013	−0.007	−0.032
					(0.107)	(0.109)	(0.147)
Vote share communists 1928-32					−0.027	−0.077	−0.130
					(0.106)	(0.118)	(0.140)
Vote share Nazis 1928-32					0.052	0.075	0.122
					(0.076)	(0.090)	(0.100)
Share unemployed 1933					−0.019	0.059	0.129
					(0.134)	(0.149)	(0.157)
Share self-employed 1933					0.130	0.130	0.080
					(0.119)	(0.132)	(0.148)
Share white collars 1933					0.002	0.014	0.099
					(0.092)	(0.096)	(0.102)
Dep. variable mean	0	0	0	0	0	0	0
Observations	203	203	203	203	200	199	198
R²	0.009	0.331	0.349	0.405	0.426	0.440	0.521
Adjusted R²	0.005	0.307	0.315	0.357	0.351	0.340	0.387
Weimar Republic-state FE						Y	Y
GDR-district FE							Y

Notes: This table reports results from regressing the average share of unofficial informers in the population over the years 1980–1988 on the set of historical controls. The unit of observation is the 1990-county level. Section 2.2 describes the historical controls. We standardize all variables (other than those measured as dummies or in log). Reported in parentheses, we cluster standard errors at the 1990-county level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

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